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Students' Learning Time

INTRODUCTION

At a time when OECD and partner countries are trying to figure out how to reduce burgeoning debt and make the most of shrinking public budgets, spending on education, which averages slightly more than 6% of GDP among OECD countries, is an obvious target for scrutiny. Education officials, teachers, policy makers, parents and students are discussing the merits of shorter or longer school days or school years, how much time should be allotted to various subjects, and the usefulness of lessons outside of school and independent study.

This report focuses on how learning time is used, both in and out of school. What are the ideal conditions to ensure that students use their learning time efficiently? What can schools do to maximise the learning that occurs during the limited amount of time students spend in class? In what kinds of lessons does learning time reap the most benefits?

To answer these questions, this report draws on data from the 2006 cycle of the Programme of International Student Assessment (PISA) to describe differences across and within countries in how much time students spend studying different subjects, how much time students spend in different types of learning activities, how students allocate their learning time and how they perform academically. PISA contains information on student performance and deliberate learning time in three specific subjects – science, mathematics and the language of instruction – and three specific settings – regular lessons at school (referred to as "regular school lessons" for the remainder of this report), out-of-school-time lessons, and individual study and homework (referred to as "individual study" for the remainder of this report). While learning may occur while students interact with friends, speak with neighbours, read magazines or go to the supermarket, this report examines the amount of time students spend on activities specifically intended for learning. These kinds of activities are defined as "deliberate learning" and include the amount of time, per week, that students report spending in regular school lessons, out-of-school-time lessons and individual study.

Other terms in this report are used to denote specific measures of students' learning time. "Absolute learning time" refers to the amount of deliberate learning time that students spend in each subject of science, mathematics or the language of instruction. "Relative learning time" refers to the proportion of total deliberate learning time in a given subject, either science, mathematics or the language of instruction, that is allocated to one of the three types of learning activities discussed in this report – regular school lessons, out-of-school-time lessons or individual study.

This report focuses strictly on students' deliberate learning activities and measures allocation of time for learning and for the opportunity to learn. Other constructs related to deliberate learning activities, such as engaged time (time when students are actively absorbing information) and quality of instruction time, were not captured in PISA 2006 data.

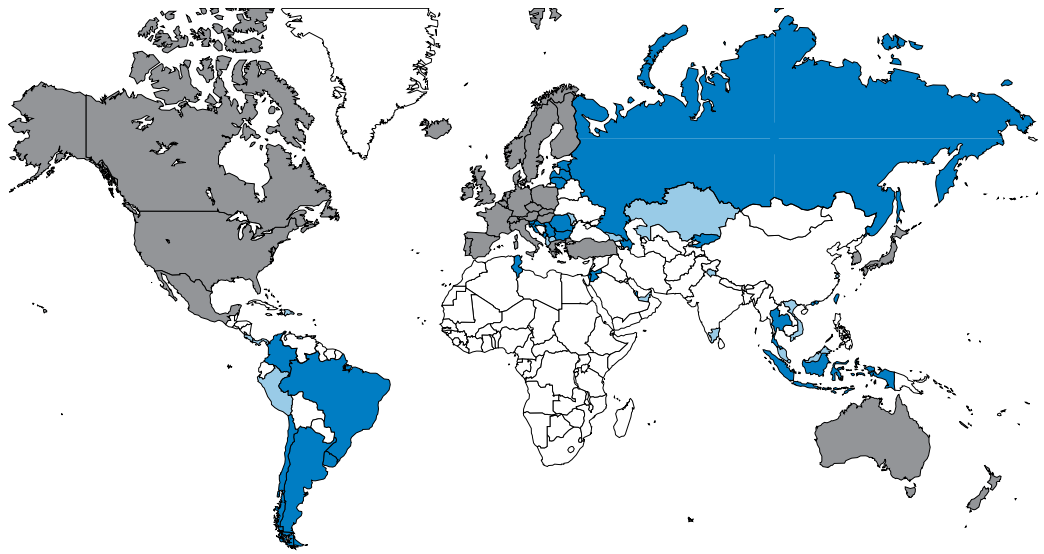
OECD PROGRAMME FOR INTERNATIONAL STUDENT ASSESSMENT (PISA)

The Programme for International Student Assessment (PISA) is one of the most rigorous and comprehensive international studies assessing students' competencies in science, mathematics and reading. PISA measures to what extent students have acquired the knowledge and skills necessary for full participation in today's knowledge-based society. The programme also explores why students perform differently in different contexts by collecting a wealth of data on individual student characteristics, students' family backgrounds and the characteristics of schools and education systems. PISA also identifies which countries are successful in achieving both high student performance and an equitable distribution of learning opportunities and, in so doing, signals sound educational policies and practices.

PISA surveys assess the performance of 15-year-old students in reading, mathematics and science (the term "student" used in the rest of this report denotes a 15-year-old student unless otherwise specified). Since these students are nearing the end of their compulsory education in most countries, PISA offers an invaluable opportunity to map the skills and competencies of young people as they enter the job market for the first time.

The first PISA survey in 2000, took place in 32 countries and focused on the domain of reading. The second survey, in 2003, was carried out in 41 countries and focused on mathematics. In 2006, PISA assessed more than 400 000 students in 30 OECD countries and 27 partner countries and economies and focused on science. Each assessment covers the other two domains, albeit as minor subjects.

Figure 1.1
A map of PISA countries and economies



OECD countries*

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

** These are the countries that were members of the OECD at the time of the PISA 2006 main data collection in 2006*

Partner countries and economies in PISA 2006

Argentina
Azerbaijan
Brazil
Bulgaria
Chile
Colombia
Croatia
Estonia
Hong Kong-China
Indonesia
Israel
Jordan
Kyrgyzstan
Latvia
Liechtenstein
Lithuania
Macao-China
Montenegro
Qatar
Romania
Russian Federation
Serbia
Slovenia
Chinese Taipei
Thailand
Tunisia
Uruguay

Partner countries and economies in previous PISA surveys or in PISA 2009

Albania
Costa Rica
Dominican Republic
Georgia
Himachal Pradesh-India
Kazakhstan
Macedonia
Malaysia
Malta
Mauritius
Miranda-Venezuela
Moldova
Netherlands-Antilles
Panama
Peru
Shanghai-China
Singapore
Tamil Nadu-India
Trinidad and Tobago
United Arab Emirates
Viet Nam

HOW PISA MEASURES STUDENTS' LEARNING TIME

In addition to assessment instruments, detailed student and school principal questionnaires are included in PISA, thereby ensuring that information about the students, their families and the schools they attend is collected. The questionnaires also gather information on students' attitudes, motivation levels and use of learning time. This report focuses on the part of the questionnaires that seek to find out how much time students spend learning science, mathematics and reading in deliberate learning activities, and how students allocate their learning time across different subjects.

In PISA 2006, the student questionnaire asked students to identify how many hours they spent learning different subjects in different settings. More specifically, questions probed students on the amount of time, per week, they spent studying science, mathematics, the language of instruction and other subjects in regular school lessons, out-of-school-time lessons, and individual study. Students indicated their learning time by ticking one of five possible categories: "No time", "Less than 2 hours per week", "2 or more but less than 4 hours per week", "4 or more but less than 6 hours per week", and "6 or more hours per week". The exact wording of the questions is displayed in Box 1.1.

Box 1.1 **Student questionnaire items for learning time**

Q31 **How much time do you typically spend per week studying the following subjects?**
For each subject, please indicate separately:
- the time spent attending regular lessons at your school;
- the time spent attending out-of-school-time lessons (at school, at home or somewhere else);
- the time spent studying or doing homework by yourself.

<An hour here refers to 60 minutes, not to a class period>
(Please tick only one box in each row)

		No time	Less than 2 hours a week	2 or more but less than 4 hours a week	4 or more but less than 6 hours a week	6 or more hours a week
	Science					
a)	Regular lessons in science at my school	☐1	☐2	☐3	☐4	☐5
b)	Out-of school-time lessons in science	☐1	☐2	☐3	☐4	☐5
c)	Study or homework in science by myself	☐1	☐2	☐3	☐4	☐5
	Mathematics					
d)	Regular lessons in mathematics at my school	☐1	☐2	☐3	☐4	☐5
e)	Out-of school-time lessons in mathematics	☐1	☐2	☐3	☐4	☐5
f)	Study or homework in mathematics by myself	☐1	☐2	☐3	☐4	☐5
	Test Language					
g)	Regular lessons in *test language* at my school	☐1	☐2	☐3	☐4	☐5
h)	Out-of school-time lessons in *test language*	☐1	☐2	☐3	☐4	☐5
i)	Study or homework in *test language* by myself	☐1	☐2	☐3	☐4	☐5

Students taking part in PISA 2006 not only reported the amount of time they spent in deliberate learning activities, they also reported the type of activities they participated in, including the type of out-of-school-time lessons. These included lessons in school-related subjects that were held outside normal school hours. Lessons could be held at school, at home or elsewhere and could be taught by either school or non-school teachers, tutors or staff. Students were asked to report whether they participated in the following activities: one-to-one out-of-school-time lessons, small group out-of-school-time lessons (lessons attended by fewer than eight students) or large group out-of-school-time lessons (lessons attended by eight students or more). They were also asked to report who (school teachers or non-school teachers) oversaw them during these lessons. The exact wording of the questions is displayed in Box 1.2.

Box 1.2 **Student questionnaire items for out-of-school-time lessons**

Q32 **What type of out-of-school-time lessons do you attend currently (if any)?**
These are lessons in subjects that you are learning at school, that you spend extra time learning outside of normal school hours. The lessons might be held at your school, at your home or somewhere else. These are only lessons in subjects that you also learn at school.
(Please tick only one box in each row)

		Yes	No
a)	*One to one* lessons with a *teacher* who is also a teacher at your school	☐1	☐2
b)	*One to one* lessons with a *teacher* who is not a teacher at your school	☐1	☐2
c)	Lessons in small groups (less than 8 students) with a *teacher* who is also a teacher at your school	☐1	☐2
d)	Lessons in small groups (less than 8 students) with a *teacher* who is not a teacher at your school	☐1	☐2
e)	Lessons in larger groups (8 students or more) with a *teacher* who is also a teacher at your school	☐1	☐2
f)	Lessons in larger groups (8 students or more) with a *teacher* who is not a teacher at your school	☐1	☐2

WHY LEARNING TIME IS STUDIED

The strong association between learning time and academic performance is widely acknowledged in the literature. Not surprisingly, the more time students spend learning, on average, the higher their grades are (Fisher *et al.*, 1980; Clark and Linn, 2003; Smith, 2002). Over the years, PISA has consistently indicated that the competency levels of 15-year-old students in reading, mathematics and science differ greatly both across and within countries (OECD, 2001; OECD, 2004; OECD, 2007). One of the factors repeatedly found to be associated with students' academic performance is students' learning time. For example, students who spend more time in regular school lessons achieve higher scores in the PISA reading, science and mathematics assessment than those who devote less time to learning.

Ever since the seminal study by John B. Carroll (1963) on the degree of learning as a function of the time a student spent learning in relation to the time the student needed, educators and policy makers have attempted to understand how students' learning activities should be organised to maximise learning (Bloom, 1968). The literature suggests that optimising academic learning time is one of the key factors to improving academic achievement (Carroll, 1989; Hawley and Rosenholtz, 1984; Sheerens and Bosker, 1997; Marzano, 2003).

Thus, the length of time one spends participating in deliberate learning activities may be important, but not necessarily the most important factor in learning.

The basic premise of Carroll's model is that under fixed-time conditions, individual characteristics, such as inherent ability, motivation, social environment and schooling, work together with circumstantial factors, such as the quality of teaching, and translate into various degrees of learning and achievement. Learning time is thus necessary, but not sufficient, for acquiring knowledge. Effective learning ultimately depends on the way in which time is organised, the proportion of time dedicated to students' perseverance, or full engagement, in learning and the time students with varying aptitudes and motivation levels require to internalise concepts and elaborate ideas (Carroll, 1989).

Factors such as ability and motivation differ greatly among students (OECD, 2007) and are likely to have a strong influence on the rate of learning that occurs per hour to acquire knowledge and eventually mastery (Anderson, 1984). In other words, the learner plays a fundamental role in determining how well learning time is used.

In practice, not all time spent learning is the same, and Carroll points out that the association between learning time and achievement is likely to depend on the circumstances in which learning occurs. Individuals are constantly exposed to a multitude of stimuli. While learning takes place in a variety of formal and informal settings, not all learning is of equal value; young adults are endowed with different skills and competencies in a variety of specific domains, such as reading, mathematics and science. Research indicates that structured lesson time at school (referred to as "regular school lessons" in this report) is an important pre-requisite for students to develop the competencies that are assessed in the PISA science framework (Scheerens and Bosker, 1997; Seidel and Shavelson, 2007).

School-level factors, such as teaching practices, can also have an impact on academic performance across schools and classrooms as well as on subjects within the same classroom (Aaronson *et al.*, 2007; Hanushek, 1986). Less is known about how out-of-school-time lessons and individual study can promote academic achievement or be better organised to develop students' skills and impart knowledge.

Since deliberate learning activities, such as regular school lessons, are more apt to create a level playing field for students, it is valuable to comprehensively map students' involvement in them. Both the quantity and quality of opportunities that young people have to learn in informal situations are likely to vary significantly across social groups. Indirect evidence of this comes from studies examining possible causes for the social gradient in the cognitive skills of young children entering school (Hart and Risley, 1995; Natriello *et al.*, 1990; Huttenlocher *et al.*, 1991; Jencks and Phillips, 1998). In these studies, differences in informal learning opportunities can be attributed to: more restricted vocabulary used by adults in the social networks of children coming from disadvantaged backgrounds; lower participation rates in pre-school education among children from disadvantaged backgrounds; the lack of educational resources available to parents with little education; and the fact that the achievement gap between social groups tends to grow during school breaks, reflecting differences in what children are exposed to while outside of school and formal learning environments.

AIMS AND ORGANISATION OF THE REPORT

This report contains a comprehensive and rigorous description of learning time in a comparative context and draws on data from 57 countries and economies. Its aim is to examine cross-country and within-country variations in students' participation in deliberate learning activities and links to academic performance in science, mathematics and reading. When interpreting the results, it is important to keep in mind the limitations of the PISA data as described in Box 1.3.

The report investigates how students organise their learning time and what effect this has on their academic performance. The questions posed by the report include:

Do students from different countries organise their learning time and activities differently?

Chapter 2 responds to this question by examining whether the time students spend learning different subjects in different settings varies by country. The report provides a detailed overview of cross-country differences in how students organise their learning time across three subjects – science, mathematics and the language of instruction – and three types of activities – regular school lessons, out-of-school-time lessons and individual study. The latter half of Chapter 2 focuses on different types of out-of-school-time lessons and describes patterns of students' learning time spent in these different types of lessons across countries.

Do students from different population sub-groups within countries organise their learning time and activities differently?

Chapter 3 investigates within-country variations in deliberate learning time and activities by comparing differences in the amount of learning time, patterns of learning time allocation across different settings, and participation rates in the different types of out-of-school-time lessons for various student sub-groups. First, the chapter focuses on individual characteristics of students, such as gender, socio-economic background and immigrant background. Then it examines the structural characteristics of schools and assesses whether students' deliberate learning time and activities are related to the characteristics of the schools themselves, such as upper secondary or lower secondary, public or private, academic or vocational and school location.

What are the cross-country and within-country relationships between learning time and performance?

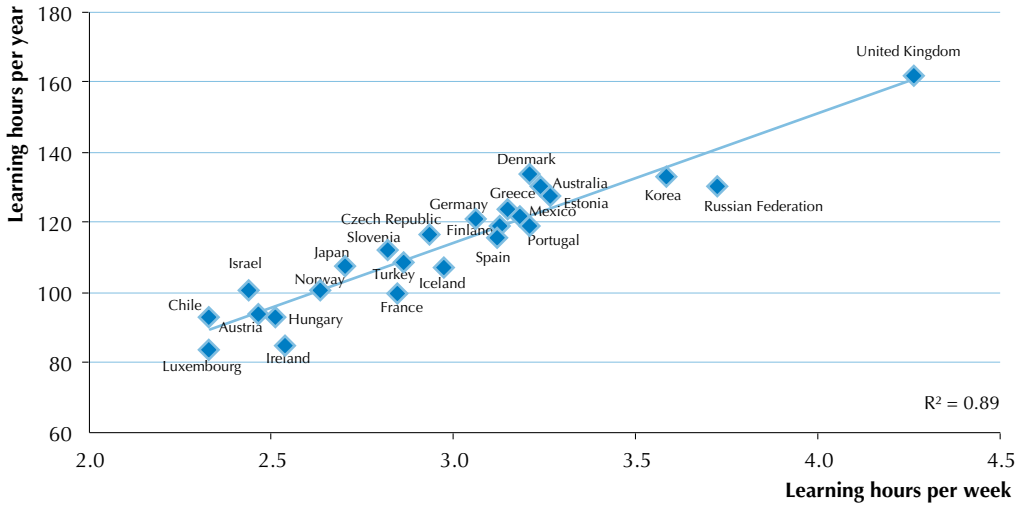
Chapter 4 begins by examining the relationship across countries and then looks at the relationship within countries. While how much time students spend in deliberate learning activities is important in relation to performance, how students spend their time learning is also important. This chapter also closely examines the use of learning time in regular school lessons and out-of-school-time lessons.

Chapters 2 and 3 also present detailed descriptive statistics on the time students spend learning, which will help highlight the relationship between students' learning time and their academic performance.

Box 1.3 Interpreting the data on students' learning time

The data on students' learning time used in this report are based on 15-year-old students' self-reports on their "typical" use of time per week at the time of the PISA data collection. The time students spend learning each subject might vary according to the week. The number of instruction weeks per year may also vary across education systems, depending on the length of the school year and vacation time. The scatter plot below presents the relationship between the numbers of hours per week and the number of hours per year spent in regular school lessons in science. The system-level data on the number of weeks of instruction time, as part of the teachers' working time (*Education at a Glance 2009*, OECD), is used as a proxy for the number of instruction weeks per year in each education system. This is then multiplied by the number of school lessons per week, taken from the students' reports in PISA. This linear relationship between two indicators, as seen in the scatter plot, confirms that the numbers of hours per week spent in regular school lessons could be a good proxy for the numbers of hours per year spent in regular school lessons.

The relationship between learning hours per week and learning hours per year



Source: *OECD PISA Database 2006*, Table 2.2a, *EAG Database 2009*, Table D4.2.

There are several reasons to be careful when interpreting the data. The deliberate learning time that students report in PISA may be only partially indicative of the learning time that shapes students' educational experiences. Earlier schooling experiences should be considered to develop a complete picture of a student's learning time. For example, students might spend more time in out-of-school-time lessons or individual study during a year when they have an entrance or exit examination.

In addition, the nature of out-of-school-time lessons is not necessarily the same across countries and even within countries. Even when students report attending the same type of out-of-school-time lessons, they might attend a lesson with different incentives and objectives. For example, some schools offer additional lessons to students who need remedial education, while other schools offer them to students who seek further enrichment. In some countries, out-of-school-time lessons with school teachers are systematic and standardised across schools, while in other countries these are organised by individual schools and the quality of lessons varies greatly from school to school.

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As practice varies among and within countries, it is difficult to generalise about the differences between out-of-school-time lessons with school teachers and those with non-school teachers. In some countries, tuition fees are charged for out-of-school-time lessons with non-school teachers, but fees are not charged for lessons with school teachers. In other countries, the opposite is true, or the setup of out-of-school-time lessons with any kind of teacher may be entirely different. Since socio-economically disadvantaged families may have difficulties paying additional tuition fees, out-of-school-time lessons could contribute to an inequality in educational opportunities. Given that out-of-school-time lessons across and within countries vary so much, and because this variability is not captured in the data in this report, it is impossible to generalise about the effects of out-of-school-time lessons.

Other factors related to out-of-school-time lessons must also be considered, such as the cost of lessons, quality of teaching, resources (textbooks, school materials, etc.) used during lessons and motivation of students to participate in lessons.

Examining the relationship between learning time and performance discussed in Chapter 4 is especially complex. Because the analysis is based on cross-sectional data, it is difficult to determine the causality of the relationships. For example, students may spend more time in out-of-school-time lessons because their parents, their teachers or they themselves might think that they need to catch up with other students by attending extra classes. On the other hand, students may spend more time engaging in individual study because they require more time than other students to complete a certain number of tasks.

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